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Forest Health Protection
Pacific Southwest Region

Date: April 9, 2009
File Code: 3420

To: District Ranger, American River Ranger District, Tahoe National Forest

Subject: Evaluation of grasshopper injury to sugar pine seedlings in the Foresthill Forest Genetics Center (FHP Report NE09-02)

At the request of Paul Stover, Geneticist, El Dorado National Forest, and Bill Cozad, Seed Orchard Manager, American River Ranger District, Tahoe National Forest, Danny Cluck, Forest Health Protection (FHP) Entomologist, conducted a field evaluation of the Foresthill Forest Genetics Center (FGC) on September 8, 2008. The objective of the visit was to observe the extent of grasshopper feeding on sugar pine seedlings and discuss potential treatment alternatives. Recommendations provided in this report will assist with the development of a control strategy for these insects.

Background

The Foresthill FGC is located about seven miles NE of Foresthill, CA at elevations ranging between 4,100 and 4,300 feet (T14N, R11E, Sections 3, 4 and 9). The entire area was burned in the 1960 Volcano Fire and the FGC was subsequently established as a seed orchard and progeny test area. The FGC has an integrated pest management program that is covered under an environmental assessment (1997).

Observations

High numbers of grasshoppers (Acrididae, short-horned grasshoppers) were observed throughout the newly established sugar pine orchard sunning in open areas and resting and feeding on

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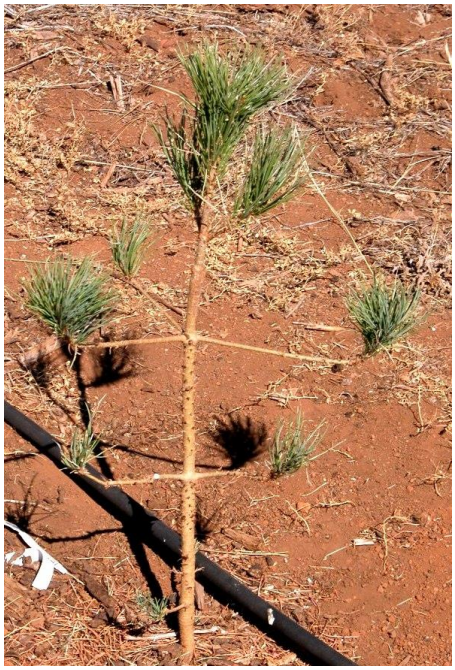

Figure 1. Partial defoliation of sugar pine seedling from grasshopper feeding.

sugar pine seedlings. This feeding activity resulted in the partial defoliation of many seedlings (Figure 1) and the mortality of a few individuals (Figure 2). Competing vegetation (mostly grass) was mowed early in the summer to avoid providing a significant food source for developing grasshoppers.

Discussion

Grasshopper populations in the newly established sugar pine plantation have been at a higher than normal level for the past two years, based on observations of FGC personnel, with the highest populations and significant injury to seedlings occurring in 2008. Grasshopper population are likely increasing in neighboring un-mowed areas and then migrating into the plantation after other un-mowed vegetation has dried. There is a high probability that elevated population levels, and associated seedling injury, will continue in 2009 as most outbreaks tend to last two to three years. Young sugar pine seedlings, already in a weakened condition due to previous feeding injuries, are likely to suffer high levels of mortality with additional grasshopper feeding in 2009.

Management Alternatives

No action:

Grasshopper populations may continue to be at high levels in 2009. Grasshoppers will likely invade the plantation after other vegetation has dried and feed on conifer seedlings. This feeding activity will likely cause unacceptable levels of seedling injury and mortality.

Figure 2. Seedling mortality caused by grasshopper feeding.

Treat with a registered insecticide:

Several insecticides are registered in California for controlling grasshoppers. These are either applied as bait that is dispersed throughout the treatment area or as sprays applied directly on insects and vegetation. These products have different modes of action, safety requirements and application rates.

Esfenvalerate (Asana XL) would appear to be the insecticide of choice since it is currently covered under the Foresthill FGC Environmental Assessment (EA) and is registered for use in

controlling grasshoppers on forest sites (See Special Local Need Label 24(c) - EPA SLN NO. CA-990022). This insecticide should be applied in un-mowed or non-herbicide treated vegetation around the perimeter of the plantation when grasshoppers are in the early nymphal stage. If grasshoppers still invade the plantation then applications can be made to individual seedlings. Asana XL should not be applied to bare soil as this will increase the breakdown of the active ingredient and minimize the exposure to grasshoppers. Refer to the product label for application rates and safety information. The Foresthill FGC EA provides additional information regarding human and environmental health concerns regarding the use of this product.

If you have any questions regarding this report and/or need additional information please contact Danny Cluck at 530-252-6431.

/s/ Danny Cluck

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GRASSHOPPER INFORMATION

Grasshoppers are sporadic pests of young conifer plantations. However, in some years large populations may build up in foothills and rangelands, especially after a wet spring and then migrate into plantations causing defoliation of most seedlings. Grasshoppers also feed on buds and bark of young conifers and can seedling by girdling stems. Over 200 species of grasshoppers occur in California, but only a few of these cause significant problems for agriculture. The valley grasshopper, *Oedaleonotus enigma*, and the migratory grasshopper, *Melanoplus sanguinipes*, have both caused significant damage in coniferous plantations in California.

IDENTIFICATION AND LIFE CYCLE

Grasshoppers are readily distinguished from most other insects. Their hind legs, with greatly enlarged femurs, are well adapted for jumping. Their bodies are robust and their antennae relatively short. In contrast, two other common garden pests in the order Orthoptera, crickets and katydids, have long antennae. Most grasshoppers are winged and many are good flyers, although a few species are flightless.

In late summer and fall, adult female grasshoppers deposit their eggs in undisturbed areas such as grassy foothills, ditch banks, roadsides, fence rows, pasture areas, and alfalfa fields. Eggs are laid in the upper 2 inches of soil in elongate egg pods that contain 20 to more than 100 eggs. When soil temperatures warm in spring, the eggs hatch and the young nymphs begin to feed on nearby plants. Nymphs readily move to new locations when food supplies disappear. Most species molt five to six times before becoming adults and usually have only one generation a year. Adult grasshoppers can live 2 to 3 months; they die out when food becomes scarce or when the weather becomes too cold. Many grasshoppers are consumed by predators such as birds, blister beetles (which feed on eggs), and robber flies. Fungal and bacterial diseases and parasites also kill grasshoppers.

Grasshopper population size varies from year to year and severe outbreaks normally occur only every 8 to 10 years. Some outbreaks last 2 or 3 years. If favorable conditions such as warm, moist springs that produce a lot of food in the foothills and uncultivated areas persist for several years, populations may build to high levels. Major migrations, which cause the most damage, occur when populations are high and forage becomes depleted.